

The CARTOPRIME module with the Coherent Mapping algorithm for ablation of complex (scar-related) atrial tachycardia

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Localizing postsurgery complex atrial tachycardia (cAT) on radiofrequency catheter ablation (RFCA) and defining its mechanism may prove to be a challenge. Mechanisms of arrhythmia are related to surgical incisions, atrial dilatation, and structural remodeling causing the conduction to slow, which in turn creates the setting for macro-reentry circuit.¹ Activation mapping based on local activation time (LAT) may be insufficient for cAT due to inaccurate activation timing, reconstruction errors, or masking of conduction barriers by color interpolation.²

Conventional entrainment mapping is useful; however, it has its limitations.³ An algorithm of mapping presented recently in a new CARTOPRIME module (Biosense Webster), listing coherent coloring, vector velocity, or visualization of structural barriers of conduction (slow or no conduction zone), increases feasibility of eliminating critical isthmus in atrial tachycardia (AT).⁴ Often, obtaining cavotricuspid isthmus (CTI) block is vital for a successful AT ablation.⁵ The Coherent Mapping algorithm uses the anatomy and point information of an existing LAT map, including all points across the entire chamber globally. A velocity vector map displays direction and relative conduction speed across the entire chamber, which makes the interpretation of LAT more intuitive. Demonstrating arrhythmic substrate, including a scar, is vital in determining the mechanism of arrhythmia and the potential ablation spot. The new algorithm, apart from showing low bipolar voltage

areas and presence of double potentials, automatically analyzes activation of opposing vector of propagation (FIGURE 1A).

We present 2 successful cases of cAT ablation using the Coherent Mapping algorithm. The first patient was a 58-year-old woman with symptomatic persistent atrial tachycardia, resistant to pharmacological treatment after open-heart correction of the sinus venosus atrial septal defect with anomalous pulmonary venous connection in 1995. Additionally, in 2018, RFCA of CTI and atypical scar-related AT in the right atrium was performed. The second patient was a 26-year-old man after an open-heart surgery for persistent ductus arteriosus and ventricular septal defect in the first year of life, with long-lasting drug-refractory atrial flutter. In both cases, using a multielectrode high-density mapping catheter (PENTARAY, Biosense Webster Inc., Diamond Bar, California, United States) activation and voltage maps were performed. In the first case, after applying the Coherent Mapping algorithm, macro-reentrant ATs were diagnosed (cycle length, 370 ms) with critical isthmus in the inferior part of the postatriotomy scar (FIGURE 1B). In the second case, a low voltage area as well as double and fragmented potentials were found in the postsurgical incision on the posterior wall of the right atrium. Nevertheless, after the Coherent Mapping module was applied, AT (cycle length, 350 ms) around the tricuspid annulus was found (FIGURE 1C). Entrainment mapping confirmed an optimal spot for RFCA

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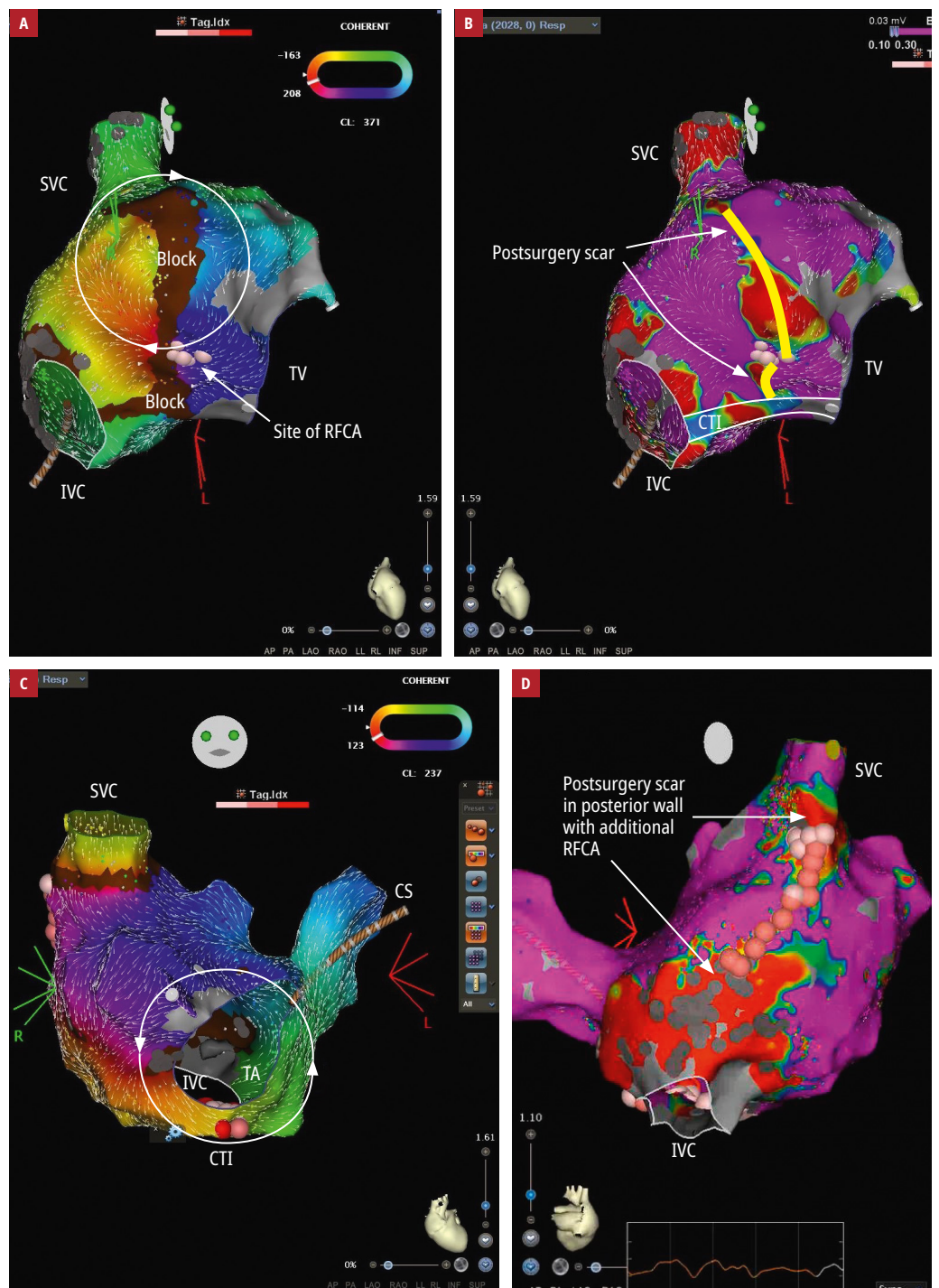


FIGURE 1 **A** – activation map of atrial tachycardia (AT) with coherent mapping in a 58-year-old woman showing the right atrium (RA) macro-reentry loop around the post-surgery scar with critical isthmus in the inferior region of the scar in the right lateral view. Annotation of conduction block based on the vector of propagation (opposed direction, automatic annotation), low voltage, and double potentials; **B** – potential map of the RA in the same patient showing a low-voltage area in the post-surgery scar in the lateral wall and cavotricuspid isthmus (CTI) region after previous radiofrequency catheter ablation (RFCA) in the right lateral view; **C** – activation map of macroreentry AT in a 26-year-old man with vectors of propagation circulating the tricuspid annulus in the Coherent Mapping module; **D** – bipolar map with fractionated electrocardiograms in the posterior RA wall in the same patient. Arrows show an additional line in the post-surgery scar. Abbreviations: IVC, inferior vena cava; SVC, superior vena cava; TV, tricuspid valve

in both cases. In the first case, AT was terminated after applying in the critical isthmus (FIGURE 1A). In the second case, achievement of bidirectional block in CTI was crucial for AT termination.

Also, an additional line between the superior vena cava and the low-voltage region was made (FIGURE 1D). At follow-up, cAT was not inducible any more.

In conclusion, the mechanism of cAT associated with macroreentrant right atrial tachycardia involves the scar after atriotomy and CTI. The Coherent Mapping algorithm (the CARTOPRIME module) is a quick and feasible method to identify a critical spot for successful RFCA.

ARTICLE INFORMATION

CONFLICT OF INTEREST GK and MK received travel expenses coverage and EP training course fee from Biosense Webster. Other authors declare no conflict of interest.

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